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Europäisches
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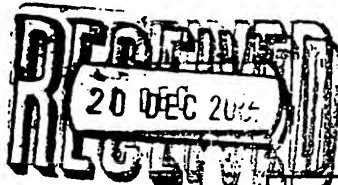
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Date/Date

27.12.02

Zeichen/Ref./Réf. AFB/JAS/P8929EP	Anmeldung Nr./Application No./Demande n°/Patent Nr./Patent No./Brevet n°. 02255310.1-2301-
Anmelder/Applicant/Demandeur/Patentinhaber/Propriétaire/Titulaire AIR PRODUCTS AND CHEMICALS, INC.	

COMMUNICATION

The European Patent Office herewith transmits as an enclosure the European search report for the above-mentioned European patent application.

If applicable, copies of the documents cited in the European search report are attached.

☒ Additional set(s) of copies of the documents cited in the European search report is (are) enclosed as well.

The following specifications given by the applicant have been approved by the Search Division:

☐ abstract

☒ title

☒ The abstract was modified by the Search Division and the definitive text is attached to this communication.

The following figure will be published together with the abstract:

3

COPY

REFUND OF THE SEARCH FEE

If applicable under Article 10 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 565 216 A (MEIER WERNER) 21 January 1986 (1986-01-21) * column 2, line 26-64 - column 4-5; figures 2,3 *	1-31	F25J3/02 B01D3/00
D,X	US 6 338 774 B1 (LEHMAN JEAN-YVES) 15 January 2002 (2002-01-15) * column 5, line 52 - column 6, line 26; figure 7 *	1-27,30, 31	
X	US 6 395 138 B1 (DARREDEAU BERNARD ET AL) 28 May 2002 (2002-05-28) * column 4, line 9-27; figures 1,2 *	1-27,30, 31	
X	US 6 294 053 B1 (DARREDEAU BERNARD) 25 September 2001 (2001-09-25) * column 3, line 20 - column 4, line 67; figures 3,4 *	1-27,30, 31	
D,A	EP 0 930 088 A (AIR PROD & CHEM) 21 July 1999 (1999-07-21) * paragraphs '0012!-'0018!; figures *	1-31	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	DE 11 13 680 B (HYDROCARBON MINERALOEL G M B H) 14 September 1961 (1961-09-14) * the whole document *	1-31	F25J B01D
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 4 December 2002	Examiner Göritz, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-27,30,31

Apparatus for liquid-vapour separation processes comprising, in fluid communication, a liquid distributor and a liquid-vapour separation column tiltable from the vertical.

2. Claims: 28,29

A liquid distributor comprising a primary distributor zone and at least one secondary distributor, wherein the total cross sectional area of said primary distributor zone defined by the outer periphery thereof is less than the corresponding cross sectional area of the or each secondary distributor.



CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 25 5310

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-12-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4565216	A	21-01-1986	CH	660308 A5	15-04-1987
			AU	566572 B2	22-10-1987
			AU	2517384 A	06-09-1984
			BR	8400873 A	09-10-1984
			CA	1218011 A1	17-02-1987
			DE	3463896 D1	02-07-1987
			EP	0118029 A1	12-09-1984
			JP	1677907 C	13-07-1992
			JP	59173101 A	01-10-1984
			JP	63066242 B	20-12-1988
			NO	840776 A ,B,	03-09-1984
US 6338774	B1	15-01-2002	FR	2771017 A1	21-05-1999
			AU	1491199 A	07-06-1999
			BR	9814646 A	03-10-2000
			CA	2310124 A1	27-05-1999
			CN	1282266 T	31-01-2001
			EP	1032464 A1	06-09-2000
			WO	9925445 A1	27-05-1999
			JP	2001523541 T	27-11-2001
			NO	20002531 A	11-07-2000
			TW	438614 B	07-06-2001
US 6395138	B1	28-05-2002	FR	2771019 A1	21-05-1999
			AU	750683 B2	25-07-2002
			AU	1161399 A	07-06-1999
			BR	9814649 A	03-10-2000
			CA	2310096 A1	27-05-1999
			CN	1282265 T	31-01-2001
			EP	1034019 A1	13-09-2000
			WO	9925447 A1	27-05-1999
			JP	2001523543 T	27-11-2001
			NO	20002535 A	12-07-2000
			TW	436312 B	28-05-2001
US 6294053	B1	25-09-2001	FR	2771018 A1	21-05-1999
			AU	746827 B2	02-05-2002
			AU	1161199 A	07-06-1999
			BR	9814648 A	21-08-2001
			CA	2310126 A1	27-05-1999
			CN	1282267 T	31-01-2001
			EP	1034018 A1	13-09-2000
			WO	9925446 A1	27-05-1999
			JP	2001523542 T	27-11-2001
			NO	20002533 A	12-07-2000
			TW	467758 B	11-12-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 25 5310

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-12-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0930088	A	21-07-1999	US	6149136 A	21-11-2000
			EP	0930088 A2	21-07-1999
			JP	3074628 B2	07-08-2000
			JP	11253788 A	21-09-1999
			NO	990220 A	21-07-1999
<hr/>					
DE 1113680	B	14-09-1961	NONE		
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ABSTRACT / ZUSAMMENFASSUNG / ABREGE

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Liquid is distributed substantially uniformly in a liquid-vapour separation column located on an off-shore floating platform such as a ship using a liquid distributor comprising a primary distribution zone (18) and at least one secondary distributor (20), the primary distribution zone being in fluid communication with the or each secondary distributor (28) and the or each secondary distributor having a plurality of liquid distribution apertures (36) providing said fluid communication between the liquid distributor and the column. The liquid distributor is characterised in that:

- i) The distance between the two apertures that are furthest apart in the or each secondary distributor (the "characteristic length") is such that the liquid distributor provides, at each angle of tilt, a standard deviation of liquid flow rates through the apertures of the or each secondary distributor that is less than a first predetermined maximum for all angles of tilt; and
- ii) the difference in flow rate between the aperture having maximum liquid flow and the aperture having minimum liquid flow in the or each secondary distributor at each angle of tilt is less than a second predetermined maximum for all angles of tilt,

said first and second predetermined maxima being determined by the required degree of liquid-vapour separation. On advantage of such a liquid distributor is that liquid can be distributed substantially uniformly when the column is tilted.